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March 24, 2006

Ms. Julie Raming
Georgia Pacific Corporation
133 Peachtree Street, NE
P.O.Box 105605
Atlanta, Georgia 30303

Re: Review of the Draft Human Health and Ecological Risk Assessment Workplan for the Georgia-Pacific California Wood Products Manufacturing Facility, Fort Bragg, California

Dear Ms. Raming:

Background

As a member of the local community, I have downloaded the Workplan from the North Coast Regional Water Quality Control Board's website and have reviewed the document for conformance with risk assessment guidance, approach, and technical content. I have lived in the community since 2000 and I have over sixteen years experience in environmental consulting and over 30 years experience as a toxicologist. I have worked with the State regulatory agencies in California conducting remedial investigations, drafting remedial investigation reports, drafting human health and ecological risk assessments, feasibility studies, closure reports, CEQA documents, and environmental impact reports for various clients.

I have previously provided the RWQCB comments on the Phase 1 Investigation and the Phase II investigation and geophysical investigation of the mill site. I have worked on several mill sites and paper mills as a consultant and am knowledgeable about timber mill practices. I have drafted and reviewed human health and ecological risk assessments for mill sites and wood treating facilities. I have provided expert testimony on the toxicity and potential human health and ecological effects of constituents identified at mill sites and wood treatment facilities.

Scope of the Review

I downloaded and reviewed the following document: "Draft Human and Ecological Risk Assessment WorkPlan for the Georgia-Pacific California Wood Products Manufacturing Facility, Fort Bragg, California." The document was prepared for the Georgia Pacific Corporation, 133 Peachtree Street NE, Atlanta, GA 30303 by Tetra Tech, Inc., 3746 Mt. Diablo Blvd., Ste. 300, Lafayette, CA

94549. The document was dated January 2006.

General Comments

The former Georgia-Pacific mill site located in Fort Bragg, California represents the largest non-military redevelopment site on the California coastline. It is located on the central Mendocino coast and is bordered on the north by the Pacific Ocean, east by the City of Fort Bragg, Noyo Harbor to the south, and Pacific Ocean to the west. The site is approximately 455 acres and has been in milled lumber production from 1885 until 2002. As an active sawmill, the facility was the economic mainstay of the Fort Bragg community for over 115 years. The former industrial facility is prime coastal property and will contribute significantly to the north coastal economy after cleanup and redevelopment. The site is pivotal to the citizens of Fort Bragg, Mendocino County, the State of California, and other parts of the country. Consequently, great care and attention is required to insure that the site is investigated, cleaned up, planned, and redeveloped to maximize the benefits to the citizens of Fort Bragg, Mendocino County, and the State of California.

The site is currently undergoing a remedial investigation to ascertain the nature and extent of contamination at the former mill facility. For ease of management, the facility has been divided into 10 parcels based on previous land use and industrial processes. Phase I and Phase II investigations of the soil and groundwater beneath the facility indicate the presence of multiple inorganic and organic constituents in the environmental media. Based on site history and use, contamination has been identified at several former industrial areas of the facility [e.g., Former Sawmill #1, Former Mobile Equipment Shop, Former Machine Shop, Former Fuel Barn, Former Paint Shop, Former Planar Mill #2, Former Power House, etc] in both soil and groundwater. Based on the Phase I and II investigations and groundwater monitoring data, over 60 potential chemicals of potential concern [COPCs] have been identified at the site. The constituents include inorganics, volatile organic compounds, semi-volatile organic compounds, various petroleum hydrocarbons, polychlorinated biphenyls, and chlorinated dioxins and furans.

The future land use of the former mill site is for multiple land uses including future residential, open space/park, industrial/commercial, recreational, and potential educational/research facilities. These uses will require that the site be thoroughly characterized and that appropriate risk-based remediation be implemented to support the intended future land use. The risk assessment guides the risk managers in making risk management decisions to achieve appropriate cleanup to protect the human and ecological health of the future land users.

Both the Human Health Risk Assessment and the Ecological Risk Assessment are integral pieces of the remedial process as they quantify the current and potential risk(s)/hazard(s) to human and ecological receptors posed by site-related constituents. The risk assessment evaluates the COPCs and chemicals of potential ecological concern [COPECs], defines the exposure routes and dosages, describes the potential toxicity of the COPCs/COPECs, and quantifies the theoretical risks/hazards that the constituents might pose to human and ecological receptors exposed to the constituents. The risk assessment does not quantify past exposures, doesn't ascribe current health issues with past chemical releases/exposures, and does not predict future health outcomes.

The current work plan generally describes all of the required parts of a risk assessment as detailed in the DTSC and USEPA guidance. However, there are several issues that are not consistent with standard risk assessment practice and protocols. One of the most striking issues is the divergence from the Cal/EPA policy for *de minimis* residential risk. The WorkPlan proposes to use a residential risk level of 1×10^{-5} [one-in-one hundred thousand] for a screening cancer risk level as opposed to the more standard 1×10^{-6} [one-in-a-million] risk level. This approach is not conservative and not protective of human health when multiple chemical exposures are involved. What is more troubling is that this risk level was buried in an appendix [Appendix B] in the back of the document. The selected risk level metric should be presented in the main body of the text under the risk characterization section. The selection of COPCs and COPECs is not consistent with Cal/EPA guidance as currently proposed. The development of background soil concentrations for metals and dioxins/furans is inconsistent with Cal/EPA guidance [DTSC, 1997]. The conceptual site models [CSMs] for both human and ecological receptors are incomplete as they ignore the ocean and intertidal zones as potential tertiary sources and receptors for constituents associated with the mill site. The omission of the ocean as a tertiary source and receptors is inconsistent with the current and future land use and represents a huge data gap. The calculation and presentation of risk based screening concentrations [RBSCs] for soil and groundwater is confusing. RBSCs serve virtually no purpose as it is inappropriate to screen out COPCs /COPECs based on a screening criteria for organic constituents [DTSC, 1994]. If screening values are to be considered qualitatively, the USEPA Region IX Preliminary Remediation Goals should be considered as they are peer reviewed [USEPA, 2005]. Inorganics [metals] may be excluded from consideration as COPCs/COPECs if they are essential nutrients or within the site-specific background concentrations.

Specific comments are provided below for the human health and ecological risk assessments.

Specific Comments

Human Health Risk Assessment

1. The largest by area future land use for the facility is residential development followed by commercial, recreational, open space/park, wetlands, coastal trail corridor, and perhaps an educational/research facility. The facility has been divided into 10 major parcels based on former mill activities. Some of these areas may not be suitable for future residential development [based on location, geological conditions, wetlands, contaminants, etc] and these areas may not need to be remediated to residential standards. Identifying these areas will decrease additional site characterization required for those areas where non-residential development may be considered. However, areas such as Parcels 1, 3, 7, 8, & 10 will require additional soil sampling if they are to be future residential areas as the existing sample density is inadequate to support residential standards. Randomized grid sampling at a density of at least 4 samples per acre is recommended for future residential land that has been used as a former industrial facility.

2. Given the quality of the original geophysical investigation and results of the two-site geophysical study by 3-D Geophysics, additional geophysical investigation is warranted for the entire facility [including the mill ponds]. A detailed study using 3-D Geophysics could save time and effort for additional field investigation at the facility. The accurate detection and investigation of anomalies buried beneath the site can be greatly facilitated by a detailed geophysical/magnetic investigation. This will be crucial for lands destined to become residential areas.

3. In Section 2.5 it is stated that there are five major habitat areas identified at the former facility: industrial ponds, nursery area, wetland area north of the power plant, Soldier Bay beach, and the southern edge properties. In addition, five environmentally sensitive habitat areas are present at the site: streams, riparian habitat, coastal bluff, coastal waters, and intertidal/marine areas [WRA, 2005]. The site has over 3 miles of coastal habitat along the western edge of the property. These areas will provide recreational opportunities for future residents and visitors on the site and provide ongoing and future residence for wildlife species using the site. The baseline risk assessments [human health and ecological] must consider these habitats and receptors for future development. As such, the conceptual site models must be revised to include human recreational receptors, appropriate ecological receptors and the intertidal zone and ocean as part of the facility. Hence,

additional sampling in these zones will be required to address these areas in the risk assessment.

4. In the discussion of data sources in Section 3 of the Workplan, a data quality assessment is mentioned in the text and it states that the data have been subjected to quality assurance/quality control procedures. There is no mention of 3rd party data validation of any of the data for use in the risk assessment. For a site as important as this one to the community of Fort Bragg, it is recommended that at least 30 % of the data used in the risk assessment be 3rd party reviewed and the data validated using standard USEPA data validation procedures. The Level IV data validation packages should be provided to the regulatory agency for their review

5. In Section 3.2.1 where the proposed foundation removal to facilitate additional soil sampling is discussed, it is clear that core drilling and angle drilling can accomplish similar characterization and the public will have the ability to review the data prior to the determination of the appropriate remedial action. The current proposal eliminates public review of the data and public participation in the remedy selection process. In addition, the razing of many of the structures has been conducted without public input. The removal of the power plant and the hog should have encountered ash in the boilers. There is no evidence that ash samples from the boilers were sampled prior to their removal. The ash should have been sampled and disposed of properly with regulatory oversight. Ash samples from the boiler taken in 1990 indicated the presence of low levels of dioxins in the diluted samples [Exponent, 2004]. The ash contained metals and potentially dioxins [perhaps a hazardous waste depending on levels] and should have been sampled and reported as part of the site characterization investigation. This represents a data gap. Since land disposal regulations for dioxins prohibit disposal even at Class I landfills, where were the ashes disposed?

6. Review of the analytical methods proposed for future sampling indicated some analyses that may not be useful or sufficient. The analysis for total oil and grease by USEPA Method 1664A will provide no useful information for the risk assessment. Analysis for chlorinated dioxins and furans by USEPA Methods 8280 or 8290 may not provide congener specific results with sufficient health protective detection limits. Lower detection limits can be achieved using USEPA Method 8390. The more stable [and preferred] analysis for Cr^{+6} is USEPA Method 7199. This method provides more consistent reporting results for hexavalent chromium. The use of 8080 or 8082 for PCB analysis will not provide correct analysis for the coplanar PCB congeners in the ecological risk assessment. Suggest USEPA 1668 modified which is a congener-specific GC/MS method that is a modified 8082.

7. The use of 0 to 2 feet as "surface soil" is not health protective or consistent with current regulatory guidance. Both the DTSC and USEPA have defined surface soil as 0 to 6 inches in the soil column [see DTSC, 1992, USEPA 1989]. The 0 to 2 foot interval is described by the ATSDR guidance [ATSDR, 2005]. The use of the DTSC/USEPA recommended surface soil interval [0 to 6 inches] is imperative as it does not dilute the effect of highly immobile constituents such as PCBs and dioxins that remain at the soil surface. This is important for both potential human and ecological receptors. This needs to be corrected throughout the document.

8. In Section 3.2.3 Investigation Support, screening levels for soil and groundwater is introduced. The consultant proposes to use risk-based screening levels [RBSCs] which they developed [Appendix B]. California Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil [CHHSLs] developed specifically for Brownfileds redevelopment could be used as screen concentrations would be more appropriately applied to the site [Cal/EPA, 2005]. Alternatively, peer reviewed preliminary remediation goals from USEPA Region IX should be used if any screening criteria are to be used. Both the Cal/EPA screening levels and the USEPA PRGs have been extensively peer reviewed. The screening criteria provide an indication of the magnitude of the contamination but should not be the sole metric for implementing interim removal measures. Removal measures must have public input prior to execution. Note: some of the RBSCs calculated in Appendix B exceed groundwater MCLs and hazardous waste levels for soil.

9. The selection of background metals should follow DTSC guidance [DTSC, 1997]. The three-tiered approach proposed for estimating background ranges for metals in soils includes using the Bradford Background Metals of California study. The Bradford study should not be used since there are no soil samples taken from Mendocino or Sonoma County in their data set [Appendix C]. Background locations for soil samples and groundwater should be taken at locations where there is no evidence for site-related activities and upgradient of the facility for groundwater. Soil data from background samples can be augmented by using site data and analyzing the data distributions and plotting expected values versus concentrations and statistically determining break points in the probability plots. This technique works for normal, log normal and nonparametric data sets. Background should be described by some central tendency [mean] and confidence interval. Comparisons using a tolerance interval should not be used due to a limited sample number and the fact the tolerance limits are more applicable to widget production on an assembly line rather than environmental statistics. Figures B-2 and B-3 will require correction based on the above considerations.

10. The discussion of ambient levels of dioxins as described in the Exponent report is highly unusual [Exponent, 2004]. Chlorinated dioxins are anthropogenic compounds and they are known to exist in ambient levels in the environment. Numerous sources of dioxins, including incinerators burning landfill material, have been documented by the USEPA in the U.S. Environmental Protection Agency, The Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States: The Year 2000 Update (External Review Draft). On-line. Available: http://www.epa.gov/ncea/pdfs/dioxin/2k-update/, March, 2005. The Exponent letter report only evaluates a very low sample number of dilute fly ash samples from the power plant; yet the report documents that dioxins are generated by the power plant at the GP Fort Bragg facility. If dioxins are detected in any environmental media at the site, they are to be included in the COPCs and must be carried forth in the risk assessment; no matter what level detected.

11. In the selection of chemicals of potential concern [Section 5.1], it is stated that media sampled, includes soil, groundwater, surface water, and sediment. With the inclusion of the intertidal areas and the ocean, additional media may be sampled including deeper sediments, tissues [biota], and pore water. Population surveys may also be required. It appears from the text in the 3rd paragraph on page 17 that all organic constituents identified at the site will be included as COPCs/COPECs except for qualified laboratory contaminants. Metals retained as COPCs/COPECs will be those which exceed the background ranges established for the respective metals as determined statistically. This approach is consistent with DTSC and USEPA.

12. The surface soil definition of 0 to 2 feet needs to be corrected to 0 to 6 inches in the 6th paragraph of Section 5.1, page 17. The paragraph concerning identification of COPCs in surface water and sediments on page 18 is rather curious. Surface water and sediments in the mill ponds may be contacted by human receptors [children playing in the pond, fisher persons, etc] and ecological receptors [migratory birds, fish, etc]. The paragraph needs to be edited.

13. The power plant operated for many years at the facility with no emission control technology to control stack emissions. Windrose data and simple dispersion modeling should be used to design surface soil sampling for constituents emitted from the mill stack[s] down gradient of the stacks. These areas need to be sampled for metals and potentially dioxins associated with fly ash emissions.

14. Future receptors at the site are details as future residents, commercial/industrial workers, construction workers and open space visitors. Given the nature of future residential developments, a landscaper should be

included as a potential receptor. Recreational users should also be included as they will be birding, fishing, crabbing, and abalone diving. The latter receptor implies that there will be fish, crab, and abalone consumption of species harvested just off shore of the site. There may be fish in Ponds 6 and 8 that would be available for capture by humans and birds of prey. These receptors need to be carried throughout the discussion of exposed individuals in the document. The text, tables 1-3, and the CSM figure need to be consistent.

15. The Conceptual Site Model is inconsistent with planned future human use [Figure 5]. The report needs to include the marine environment as a tertiary source and recreational fishing and mussel harvesting. Fishing, crabbing, and abalone diving are very popular along the Mendocino coast and the bluff trail will provide access for these activities along the 3+ miles of coast line. Future residents, commercial workers, and landscapers will have dermal contact with airborne dust. Recreational users and future residents could have dermal contact with surface waters in the ponds. Homegrown produce cannot be eliminated from consideration of future residential exposure. Future commercial workers, construction workers, visitors, and landscaper may have incidental ingestion of groundwater and some may have dermal contact with groundwater. Note: The CSM for ecological receptors [Figure 6] requires revision for the same reasons above [see below].

16. The discussion of groundwater exposures on page 20 needs to include the fact that in the NCRWQCB Basin Plan, the beneficial use of the water beneath the facility is municipal/domestic use. Hence, all groundwater pathways are applicable. The discussion on page 21 needs to be consistent with the Basin Plan. Almost all of the municipal and private water consumed on the Mendocino coast comes from shallow aquifers and wells.

17. For compounds like the PCB and dioxins, the mother's milk pathway should be evaluated. This should be included in the exposure assessment section.

18. For compounds like the PCBs and dioxins, secondary pathways need to be considered. Also, for fish, crabs, and mussels, secondary pathways need to be addressed [consumption of fish]. The text and exposure parameter tables need to be revised to include these pathways.

19. For future development at the site, exposure areas may be applicable. This would be especially helpful in future residential areas. Parcels 1, 8 and 10 may be future residential areas. Additional soil sampling will be required in these areas to support residential development. Areal average or upper confidence limits for exposure areas may be applicable in these cases.

20. It appears that certain area of the former facility may have future indoor air issues. These will be evaluated using the Johnson & Ettinger model and the USEPA spreadsheets. Vapor upward migration will be assessed by the Johnson & Ettinger model and downward migration to the groundwater will be assessed using VLEACH. This approach is technically sound. As stated above, airborne dust and soil will be addressed using a dispersion model and windrose and local meteorological data. These efforts require additional details. Note: the Johnson & Ettinger models diffusion and advection not convection.

21. In the discussion of risk characterization and uncertainty analysis, it is stated that, "For residents and other receptors evaluated on the basis of an area defined by a limited sample size [e.g., on boring per 1,000 square feet], risk may be presented using a risk per unit concentration approach and estimates of risk contoured across the Site". It looks like this is applicable to groundwater contamination. This requires clarification and more detail. There is no discussion of potential uncertainties associated with the proposed risk assessment.

22. There is no data on the marine environment. This is a huge data gap. Review of aerial photographs and CaliforniaCoastline photographs indicate several outfalls, pipes, stream outlets, and other features where releases from the facility to the ocean and marine environment could occur [http://www.californiacoastline.org]. Significant effort needs to be focused on the marine and intertidal areas investigations prior to any removal actions on the site.

Ecological Risk Assessment

23. The ecological risk assessment ignores the marine habitat directly adjacent to the project although this environment is directly down gradient from the project site. Impacts to marine receptors need to be considered in the ecological risk assessment. Of particular interest are impacts associated with biocumulative compounds such as dioxins and polychlorinated biphenyls (PCBs). Dioxins and PCBs are known to accumulate in muscles and other bivalves yet this is not discussed nor is the accumulation of these compounds in higher trophic level marine species. The conceptual site model presented in Figure 6 needs to be augmented to include pathways for marine exposure and the text needs to discuss fate and transport of site related chemicals of potential ecological concern (COPECs) relative to marine ecological receptors.

24. Figure 8 is not accurate. It is agreed that waterfowl consume emergent plants and can be considered as primary consumers; however, it is harder to accept the concept of herbivorous herptiles. Only three species of reptiles in

California are herbivorous, the Chuckwalla, desert iguana and the desert tortoise, all of which live in the Mojave and Sonoran Deserts, but not in Mendocino County. All other lizards are carnivorous, feeding on invertebrates or other lizards. All snakes are carnivorous, feeding on invertebrates, other reptiles, amphibians, birds and mammals. Amphibians are also carnivorous with the exception of frog larvae which do graze on plant material but may also be predatory. The western Pond turtle has a mixed diet of invertebrates, carrion and vegetation and is not a true primary consumer. No terrestrial amphibians (adults) feed on plant material contrary to the diagram illustrated in Figure 7 (Food web for annual grassland (AGS habitat)). The diagram needs to be clarified indicating that frog larvae (tadpoles) may be primary consumers.

25. Figure 8 also shows aquatic and sediment invertebrates as primary consumers but does not illustrate their food source. In reality, aquatic and sediment invertebrates may be detritivores (feeding on decaying organic material), primary consumers or secondary consumers. Figure 8 also fails to show a carnivorous or omnivorous animal as a tertiary consumer.

26. The list of potential species that may be expected to be found at the site (Appendix D) contain many species that would not be expected to occur at the project. For example, the golden-mantled ground squirrel and the salt-marsh harvest mouse are species that do not occupy grasslands and do not occur within the project area. In the habitats they do occupy, they occur year-round and do not occupy those areas seasonally in the summer as indicated in Appendix D-2. Similarly, the wood stork is a tropical/subtropical species that may enter Southern California casually during the summer (mostly immature birds at the Salton Sea and along the Lower Colorado River) but would certainly not be expected to occur on California's north coast. The yellow-billed magpie occurs in the central valley and the coast-ranges south of San Francisco but would not be expected to occur on the coast in Mendocino County. The black-billed oystercatcher which would most certainly occur at the site is not reported in the species list for the area. The species list is highly inaccurate and should be revised to accurately reflect species known or expected to occur at the site. All of the species lists including the plants, amphibians, reptiles, birds and mammals should be checked to verify their accuracy.

27. It is interesting to note that marine coastal habitat is included in Appendix D-2 and marine mammals such as the California sea-lion and the harbor seal are listed as species expected to occur at the site but the marine habitat is not included in the risk assessment. The marine habitat needs to be included in the risk assessment and represented in the conceptual site model.

28. The risk assessment reports there are no fish in the ponds and therefore fish are not included as receptors of concern (ROCs). However, the report indicates that a pair of belted kingfishers was seen foraging on Pond 8. Although the species will feed on insects, crustaceans and amphibians, it mostly feeds on fish. It is strongly recommended that the ponds be assessed by a qualified biologist to determine if fish are present in the on-site ponds. If fish are found then they need to be included as an ROC.

29. In section 6.1.2 (Receptors of Concern), the report indicates receptors will be chosen for each of the parcels identified in the report. If the parcels are to be treated separately then they need to be identified as areas of concern (AOCs). The report also needs to provide a site-wide assessment for those receptors (eg. Raptors, coyote) that would be expected to range throughout the project area.

30. The selected ecological guilds include amphibians and reptiles. Little toxicity data is available to assess reptiles in an ecological risk assessment. Reptiles should be assessed qualitatively rather than quantitatively. Likewise, toxicity data is scant for adult amphibians, but considerable toxicity data is available for the larval stage of the amphibian lifecycle. Hazard to amphibian larvae should be assessed quantitatively. The National Ambient Water Quality Criteria do not include protection of amphibians. HERD recommends EPA (1996) as a source of toxicity values that will be protective of amphibians. No ecological guilds representative of the marine environment are presented but need to be.

31. Soil samples should be collected to a depth of 6-feet rather than 5-feet as indicated unless it can be shown that ecological receptors are not exposed to soils at this depth. The report proposes burrow air as a media of concern. It is highly recommended that direct measure of soil gas be used in the risk assessment rather than soil gas modeling in the burrow. Depending on the model, burrow soil gas generally over or underestimates actual soil gas concentrations. Direct soil gas measurements collected for indoor air evaluation can be considered conservative values appropriate for screening purposes in the ecological risk assessment. Toxicity reference values (TRVs) can be developed for many of volatile and semi-volatile organic compounds (VOCs, SVOCs) from inhalation toxicity data available from the Agency of Toxic Substances and Disease Registry (ATSDR) and or the Integrated risk Information System (IRIS). Both the ground squirrel and the burrowing owl should be evaluated against concentrations of COPECs in burrow air.

32. The soil sampling depths proposed in the report are not adequate. Surface soils (0-6 inches) should be collected separately. Organic COPECs such as polychlorinated biphenyls (PCBs) and dioxins that have high octanol-water coefficients (K_{ow}) partition strongly to the organic fraction of the soil and are

very water insoluble. Therefore, they are extremely immobile in the soil unless they are traveling with an organic such as a petroleum product. Soil samples should be collected at 0-6 inches, 6-inches to two-feet, two to four-feet and four to 6-feet.

33. The report states the primary measures of effect will include toxicity data associated with chronic reproductive or developmental impairment. Not all ecological stressors directly effect reproduction or development. For example, many organic solvents exert their primary effects on the nervous system and the liver and do not have significant impacts to reproduction or development. Measures of effect should consider toxicity data linked to organ and tissue impairment as well as reproductive and developmental effects.

34. The use of allometric equations to scale reference doses between the test and receptor species should not be used unless there is at least a two order magnitude difference between the mass of the test species and the mass of the receptor species.

35. The report proposes to calculate risk-based screening criteria rather than the more typical forward calculation of hazard quotients typical of ecological risk assessments. The report should follow the forward calculation method for ecological risk assessments presented in DTSC's Econote 2 rather than back calculating to a risk based concentration. As reference, Econote 2 can be found at, http://www.dtsc.ca.gov/AssessingRisk/upload/econote2.pdf.

36. Calculation of risk based concentrations as presented in the report is flawed. For example, the report states "*Because toxicity data are limited for birds, and because ecological risk assessments at other sites have indicated that risks to birds and small mammals are similar, separate RBSCs were not developed for birds.*" Toxic response to individual COPECs may not be the same between avian and mammalian receptors. A classic example is estrogenic effects in birds with interference of calcium deposition and associated egg shell thinning. The ecological risk assessment should follow the forward calculation method utilizing toxicity reference values as shown in the Department of Toxic Substances Control Econote 2. Also, please provide a reference supporting the statement that risks to birds and small mammals are similar.

37. It is not true that fur or feathers prevent skin contact from media. Birds will dust themselves in surface soils to rid themselves of parasites and they will bathe in water, spreading their feathers to enhance media contact. However, since the skin is relatively impermeable compared to the gut, and the concentration in surface water is normally much lower than that in the diet, the dermal exposure pathways from water is normally of much less importance than the dietary exposure pathway. Similarly, while the

concentration in food, sediments and soils may be the same, the advection rate of food through the relatively permeable gut is far higher than the advection rate of sediment or soil across the relatively impermeable skin.

38. The report indicates that groundwater will not be evaluated unless it surfaces to groundwater. However the report indicates that groundwater is shallow and therefore the report should consider possible effects to plants that may extend their roots to the groundwater. Also, the report fails to consider movement of groundwater to the marine environment and effects of COPECs associated with the groundwater to marine benthos, and intertidal and littoral ecological receptors.

39. Selected indicator species outlined in Table 8 should be modified. Separating plants into three groups (Grasses and forbs, shrubs, and trees) is impractical. Two categories of plants should be listed, aquatic and terrestrial. The western pond turtle is not an herbivore, it is an omnivore. Reptiles should only be considered on a qualitative basis. The bullfrog should replace the Pacific chorus frog because there is considerable toxicity data available for bullfrog tadpoles (Pauli et.al., 2000). A mammalian omnivore such as the deer mouse should be included as an indicator species. The deer mouse is found in virtually all habitats throughout California, feeds on invertebrates, seeds, fruits and fungi and has a home range of one half acre or less. The long-tailed shrew should be substituted for the coyote in the carnivorous mammalian guild. The weasel is more strictly carnivorous than the coyote and with a home range of 20-50acres is much more suitable as a receptor for the risk assessment then the coyote with a home range of several square kilometers. Invertebrate and vertebrate receptors for the marine environment should also be included.

40. Although Table B-3.11 reports the SSLs are derived from Navy BTAG NOAEL and LOAEL based TRVs, the Table does not reference how the SSLs were calculated. Overall, the Table is poorly presented. Sources of screening values are not provided, and derivation of the SSLs is not described. Screening levels appear inordinately high. Ecological screening levels for arsenic of 554 mg/Kg, 43,836 mg/Kg total chromium, 7,813 mg/Kg copper, 7,515 mg/Kg lead, and 24 mg/Kg mercury would be considered hazardous waste. The risk assessment should follow the guidance presented in econote 2, and calculate risk by forward calculation, not by back-calculating media risk based screening values.

Conclusions

While the Workplan contains most of the required information and generally follows Cal/EPA and USEPA guidance, there are many areas where the document is incomplete and inconsistent with current Cal/EPA guidance and not

consistent with the intended future land use. The organization of the document is confusing and fractured. The Conceptual Site Models for both the Human Health and the Ecological Risk assessments fail to include the marine environment as part of the facility as a migration/tertiary release source and as receptor source(s) for human recreational activity and environmental receptors. The selection of COPCs and COPECs is not consistent with Cal/EPA or USEPA guidance. The development of site specific background for soil and groundwater are not consistent with current Cal/EPA guidance. The development of RBSCs and their use is inconsistent with a future residential cumulative risk level of 1×10^{-6} and a hazard index of 1.0. The ecological risk assessment proposed is incomplete and generic in nature; focusing on a single rodent receptor as an indicator species. The Workplan requires significant modification and additional detail before I can agree with the proposed plan.

These comments are provided to you as critical, constructive suggestions for improving the technical quality of your document for submission to the NCRWQCB. If you require additional information or discussion, you may contact me via email dlberry@mcn.org.

Sincerely,

David L. Berry

David L. Berry, Ph.D.

Cc: Craig Hunt, Ph.D., Project Manager, NCRWQCB
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Mr. James Baskin, AICP, Coastal Planner, California Coastal Commission
Ms. Linda Ruffing, Executive Director, Fort Bragg Redevelopment Agency
Mr. Michael Gogna, Fort Bragg Redevelopment Agency
Mr. Michael Acton, AME, El Dorado Hills
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